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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/785,615

02/24/2004

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EXAMINER

DINH, TUAN T

ART UNIT

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2841

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05/05/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/785,615	Applicant(s) KELBER ET AL.	
	Examiner Tuan T. Dinh	Art Unit 2841	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 01/18/02.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 28-36 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 28-36 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. This Office Action is in response to the communications dated 01/18/2008.
Claims 28-36 are active in this application.
Claim(s) 1-27 have been cancelled.

Remarks

2. Applicants' argument filed 01/18/2008 has been considered, but are moot in view of new ground of rejection(s). See details below.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. **Claim(s) 28, 30, and 31 are rejected under 35 U. S. C. § 102 (e) as being anticipated by Inoue et al. (US 2004/0157441).**

Regarding to claim 28, Inoue discloses a conductive structure, shown in figs. 1A-C, comprising:

a first conductor (5);

a plurality of atomic layers (6/7) of a second conductor (copper, paras. [0009], [0039], [0047]) directly on the first conductor (Note: since the instant specification does not provide a specific definition of “atomic layers”, all layers which are formed by atomic particles, or atoms, could be considered as atomic layers; and it is inherent that all materials are formed by atomic layers , or atoms); and

a first material (9) directly on the plurality of atomic layers (6/7) of the second conductor, remote from the first conductor (5), the first material 9 being penetrable by the plurality of atomic layers of the second conductor relative to at least a second material other than the second conductor. See further paras. [0045-0046], [0053], and [0087-0091].

Regarding to claim 30, Inoue discloses a structure further comprising a substrate on the first conductor, remote from the plurality of atomic layers of the second conductor. See the abstract, and paras. [0003], [0057].

Regarding to claim 31, Inoue discloses a structure wherein the substrate comprises an integrated circuit wafer. See the abstract, and paras. [0003], [0057].

Claim Rejections - 35 U.S.C. § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to

a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claim(s) 29 and 32 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Inoue et al. (US 2004/0157441), as applied to claim 28 above, in view of Stokes et al. (US 6,182,500), or Toyoda et al. (US 2004/0005774).

Regarding to claim 29, Inoue discloses the structure comprising all claimed limitations as discussed above. Inoue further discloses the first conductor (5) comprises a platinum group metal (para. 0088-0091), the second conductor (6/7) comprises a metal (copper, paras. [0009], [0039], [0047]), and the second material comprises oxygen (the protective capping layer (9) is to prevent the oxidation of copper due to expose to atmosphere (para. [0097]), therefore, the first material capping layer (9) should and could not be penetrable by oxygen).

Inoue fails to disclose that the first material 9 comprises a halogen.

Stokes discloses a structure comprising a copper surface 30 and a protective capping layer 40, wherein the protective capping layer 40 comprises halogen (iodine atoms, col. 6, lines 23-40, and figs. 1, 2).

It would have been obvious to one of ordinary skills in the art at the time the invention was made to modify the invention of Inoue so that Inoue's protective layer (9) would comprise halogen, as that taught by Stokes, to prevent corrosive gases, water, or foreign matter to interact with the interconnecting copper (see col. 3, lines 21-30 of Stokes).

Alternately, Toyoda discloses a structure comprising providing a protective thin capping layer on top of a copper wiring in order to prevent oxidation, or to prevent

deterioration of the wiring performance (toyoda' para. [0003]), wherein the protective capping layer comprises halogen (such as fluorine, para. [0075]).

It would have been obvious to one of ordinary skills in the art at the time the invention was made to modify the invention of Inoue so that Inoue's protective layer 9 would comprise halogen, as that taught by Toyoda, in order to further improve the reliability of the structure. See para. [0075] of Toyoda.

In addition, as taught by Stokes, and/or Toyoda, halogen such as iodine and fluorine are known materials which could provide great protections to the surface of copper layer. It would have been obvious that selecting a known material on the basis of its suitability for the intended use is just within the general skill of a worker in the art. *Caterpillar Inc. v. Deere & Co.*, 224 F.3d 1374, 56USPQ2d 1305 (Fed. Cir. 2000); *Al-Site Corp. v. VSI Int'l, Inc.*, 174 F.3d 1308, 1316, 50 USPQ2d 1161, 1165 (Fed. Cir. 1999); *Chiuminatta Concrete Concepts, Inc. v. Cardinal Indus. Inc.*, 145 F.3d 1303, 1309, 46 USPQ2d 1752, 1757 (Fed. Cir. 1998); *Lockheed Aircraft Corp. v. United States*, 193 USPQ 449, 461 (Ct. Cl. 1977); *Data Line Corp. v. Micro Technologies, Inc.*, 813 F.2d 1196, 1 USPQ2d 2052 (Fed. Cir. 1987). Furthermore, MPEP § 2144.07 states that the selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination in *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945) (Claims to a printing ink comprising a solvent having the vapor pressure characteristics of butyl carbitol so that the ink would not dry at room temperature but would dry quickly upon heating were held invalid over a reference teaching a printing ink made with a different solvent that was

nonvolatile at room temperature but highly volatile when heated in view of an article which taught the desired boiling point and vapor pressure characteristics of a solvent for printing inks and a catalog teaching the boiling point and vapor pressure characteristics of butyl carbitol; “Reading a list and selecting a known compound to meet known requirements is no more ingenious than selecting the last piece to put in the last opening in a jig-saw puzzle.” 325 U.S. at 335, 65 USPQ at 301.). See also *In re Leshin*, 227 F.2d 197, 125 USPQ 416 (CCPA 1960) (selection of a known plastic to make a container of a type made of plastics prior to the invention was held to be obvious); *Ryco, Inc. v. Ag-Bag Corp.*, 857 F.2d 1418, 8 USPQ2d 1323 (Fed. Cir. 1988) (Claimed agricultural bagging machine, which differed from a prior art machine only in that the brake means were hydraulically operated rather than mechanically operated, was held to be obvious over the prior art machine in view of references which disclosed hydraulic brakes for performing the same function, albeit in a different environment.). See also MPEP § 2183.

Regarding to claim 32, Inoue discloses a structure comprising all claimed limitations, as discussed above, except for a first material comprises about a monolayer of the first material.

As discussed in the rejection of claim 29, it would have been obvious to one of ordinary skills in the art at the time the invention was made to replace the protective layer of Inoue by the one taught by Stokes. It is further noted that the protective layer taught by Stokes is monolayer of the first material. See col. 6, lines 23-29.

7. Claim(s) 33-36 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Inoue et al. (US 2004/0157441) in view of Stokes et al. (US 6,182,500).

Regarding to claim 33, Inoue discloses a conductive structure, shown in figs. 1A-C, comprising:

a first layer (5) comprising ruthenium (para. 0088-0091);

a second layer (6/7) comprising a plurality of atomic layers of copper (copper, paras. [0009], [0039], [0047]) directly on the first layer (5) comprising ruthenium (Note: since the instant specification does not provide a specific definition of “atomic layers”, all layers which are formed by atomic particles, or atoms, could be considered as atomic layers; and it is inherent that all materials are formed by atomic layers , or atoms); and

a third layer (9) directly on the second layer (6/7) comprising a plurality of atomic layers of copper, remote from the first layer comprising ruthenium.

Inoue fails to disclose that the first material 9 comprises iodine.

Stokes discloses a structure comprising a copper surface (30) and a protective capping layer (40), wherein the protective capping layer (40) comprises iodine (col. 6, lines 23-40, and figs. 1, 2).

It would have been obvious to one of ordinary skills in the art at the time the invention was made to modify the invention of Inoue so that Inoue’s protective layer 9 would comprise iodine, as that taught by Stokes, to prevent corrosive gases, water, or foreign matter to interact with the interconnecting copper (see col. 3, lines 21-30 of Stokes).

In addition, as taught by Stokes, iodine is a known material which could provide great protections to the surface of copper layer. It would have been obvious that selecting a known material on the basis of its suitability for the intended use is just within the general skill of a worker in the art. *Caterpillar Inc. v. Deere & Co.*, 224 F.3d 1374, 56 USPQ2d 1305 (Fed. Cir. 2000); *Al-Site Corp. v. VSI Int'l, Inc.*, 174 F.3d 1308, 1316, 50 USPQ2d 1161, 1165 (Fed. Cir. 1999); *Chiuminatta Concrete Concepts, Inc. v. Cardinal Indus. Inc.*, 145 F.3d 1303, 1309, 46 USPQ2d 1752, 1757 (Fed. Cir. 1998); *Lockheed Aircraft Corp. v. United States*, 193 USPQ 449, 461 (Ct. Cl. 1977); *Data Line Corp. v. Micro Technologies, Inc.*, 813 F.2d 1196, 1 USPQ2d 2052 (Fed. Cir. 1987). Furthermore, MPEP § 2144.07 states that the selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination in *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945) (Claims to a printing ink comprising a solvent having the vapor pressure characteristics of butyl carbitol so that the ink would not dry at room temperature but would dry quickly upon heating were held invalid over a reference teaching a printing ink made with a different solvent that was nonvolatile at room temperature but highly volatile when heated in view of an article which taught the desired boiling point and vapor pressure characteristics of a solvent for printing inks and a catalog teaching the boiling point and vapor pressure characteristics of butyl carbitol; "Reading a list and selecting a known compound to meet known requirements is no more ingenious than selecting the last piece to put in the last opening in a jig-saw puzzle." 325 U.S. at 335, 65 USPQ at 301.). See also *In re Leshin*, 227 F.2d 197, 125 USPQ 416 (CCPA 1960)

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(selection of known plastic to make a container of a type made of plastics prior to the invention was held to be obvious); *Ryco, Inc. v. Ag-Bag Corp.*, 857 F.2d 1418, 8 USPQ2d 1323 (Fed. Cir. 1988) (Claimed agricultural bagging machine, which differed from a prior art machine only in that the brake means were hydraulically operated rather than mechanically operated, was held to be obvious over the prior art machine in view of references which disclosed hydraulic brakes for performing the same function, albeit in a different environment.). See also MPEP § 2183.

Regarding to claim 34, Inoue/Stokes discloses the structure wherein the third layer comprises about one monolayer of iodine. See col. 6, lines 23-29 of Stokes.

Regarding to claim 35, Inoue/Stokes discloses the structure further comprising a substrate on the first layer, remote from the second layer. See the abstract, and paras. [0003], [0057] of Inoue.

Regarding to claim 36, Inoue/Stokes discloses the structure wherein the substrate comprises an integrated circuit wafer. See the abstract, and paras. [0003], [0057] of Inoue.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tuan T. Dinh whose telephone number is 571-272-1929. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Reichard Dean can be reached on 571-272-1984. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Tuan T Dinh/
Primary Examiner, Art Unit 2841